of the genus Mallomonas permit the author to establish a classification of this difficult division.—A new archaic inscription of the Roman forum, by A. Enmann.

*Bulletin du Jardin Botanique de St. Pétersbourg*, tome ii. fasc. i.—On the causes of the absence of wood on the *yailas* (high mountain plateaus) of Crimea, by G. J. Tanfiljew. The cause is probably in the late thawing of snow—often in May only—and the consequent saturation of the soil with water.—Lichenological notes, by A. A. Elenkin.—Communications.

*Memoirs of the Novorossian (Odessa) Society of Naturalists*, vol. xxiii., 2.—Remarks on the Crimean stag, by A. Brauner (two plates). Unlike Ward, Nikolsky and Lydekker, the author considers this stag as *C. elaphus*, L., which is near, not to the typical individuals from the forests, rich in food, of middle Europe, but to the island type (also mountain and southern type), and especially to the Corsican representative of this species (summary in German).—On the nitrification of water, by E. Gredig.—Note on the Sarmatian deposits of Transcaucasia, by V. Lashkarev, on the basis of Prof. Ernest Favre's collection at Geneva.—Fauna of the caves of Crimea, by J. Lebedinski, with one plate. First attempt to explore these caves.

## SOCIETIES AND ACADEMIES.

### LONDON.

**Royal Society**, November 28, 1901.—"Micro-crystalline Structure of Platinum." By Thomas Andrews, F.R.S.

The crystalline structure of platinum does not appear to have been studied, although it forms an interesting subject for investigation. A small ingot of pure platinum was obtained for the experiments. A section was cut therefrom and machined to 5/16th inch square and 1/10th inch in thickness. The section

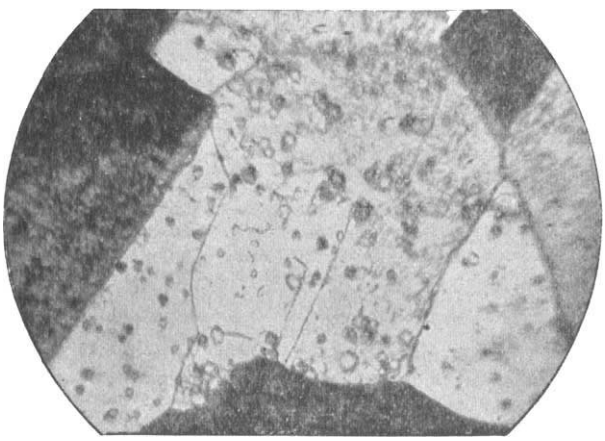

FIG. 1.—Micro-crystalline structure of platinum as seen in section at 360 diameters.

was then carefully polished and etched in aqua regia. The etching was very difficult and required the greatest care in manipulation to satisfactorily develop the crystalline structure. The result of the etching was the development of a beautiful crystalline structure which manifested, not only the large or primary crystal grains, but also the secondary or very minute crystalline development which is illustrated on a plate accompanying the paper, as seen in section at magnifications respectively of 50, 120, 360 and 360 diams. The last two of these figures are here reproduced. The larger or primary crystal grains were observed to consist of irregular polygons of varying size, the etched indications of the facet junctions being often clearly and sharply defined. The minute or secondary crystals (whose intercrystalline junctions were also clearly seen) were in the mass observed to be in varied positions of orientation, but the orientation was generally identical, or on the same plane, within the area of each larger crystal grain. The general orientation of the smaller crystals varied, however, in each separate larger crystal, and the consequent varied reflection of the light has given the face of the microsections, as a whole, the appearance of lighter or darker areas in the photomicrographs. In some portions of the mass there were observed minute triangular crystals; these appear, however, to be only developments resulting from the cutting of certain crystals in section. The general microcrystalline structure of platinum was observed to be allotriomorphic in character

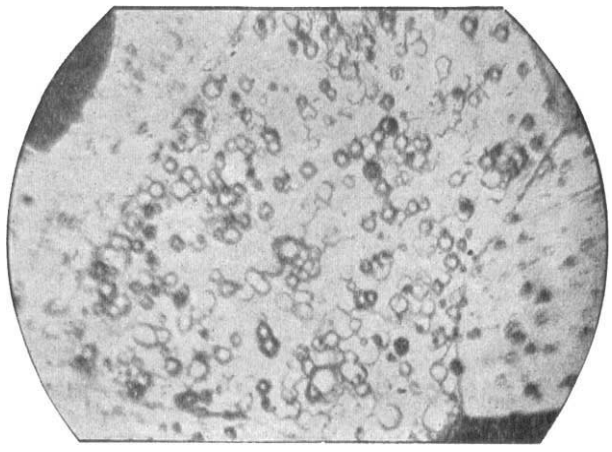

FIG. 2.—Micro-crystalline structure of platinum as seen in section at 360 diameters.

and derived from a system of interfering cubes and octahedra, the cubic and hexagonal form being frequently noticeable. The size of the large crystal grains varied from about 0·002 inch to 0·04 inch in size, and the smaller crystals ranged from about 0·0002 inch to about 0·007 inch. There were indications that the smaller or secondary crystals were each built up of even more minute crystalline ramifications. The crystalline structure of platinum appears to generally resemble that of gold and silver. The descriptive words "primary" and "secondary" crystals are only used in relation to size, and they are not intended to convey the idea of distinctive times of formation during solidification.

February 13.—"Preliminary Note on a Method of Calculating Solubilities and the Equilibrium Constants of Chemical Reactions, and on a Formula for the Latent Heats of Vaporisation." By Alexander Findlay, M.A., B.Sc., Ph.D. Communicated by Prof. Ramsay, F.R.S.

If R and R′ represent the ratios of the absolute temperatures at which two substances have the same solubility, the author shows that $R = R' + c(t' - t)$, where $c$ is a constant having a small positive or negative value and $t'$ and $t$ are the temperatures at which one of the substances has the two values of the solubility in question. The formula is precisely similar to that which Ramsay and Young showed to hold in the case of vapour pressures (*Phil. Mag.*, 1886, xxi. 33). Given the solubility curve of one substance it is therefore possible to calculate the solubility of a second substance provided the solubility of the latter at two temperatures is known. The author shows that this method can be applied to the calculation of "equilibrium constants" of chemical reactions.

It is further shown that if $L_1$ is the known latent heat of vaporisation at the absolute temperature $T_1$ of one substance, and $L_2$ the latent heat of the second substance at the temperature $T_2$ at which the vapour pressure of the second substance is equal to that of the first at the temperature $T_1$, then $L_1/L_2 = T_1^{x_1}/T_2^{x_2}$. A less exact, but simpler formula is $L_1 = L_2 T_2^{x}$. These formulæ appear not to be applicable when the pressure exceeds 10,000–20,000 mm.

February 20.—"On a Pair of Ciliated Grooves in the Brain of the Ammocœte, apparently serving to promote the Circulation of the Fluid in the Brain-cavity." By Arthur Dendy, D.Sc., F.L.S., Professor of Biology in the Canterbury College, University of New Zealand. Communicated by Prof. G. B. Howes, F.R.S.

The author demonstrates the existence in the brain of the Ammocœte of a pair of remarkable ciliated grooves. The structures in question were discovered by the author in the

Ammocœte of *Geotria australis*, the New Zealand lamprey, and subsequently he found similar organs in sections of an Ammocœte of *Petromyzon* in the zoological laboratory of Owens College. The grooves in question run along the roof of the brain-cavity from about the hinder margin of the posterior commissure to the *recessus subpinealis*. They are lined by a sharply defined epithelium of very long columnar cells, and their concave surfaces are covered with short cilia. The function of these organs is apparently to promote the circulation of the fluid in the brain-cavity, and this view is supported by the arrangement of the choroid plexuses. In the New Zealand Ammocœte the choroid plexus of the mid-brain dips down into the *iter* in the shape of a highly vascular longitudinal septum dividing the upper part of the brain-cavity in this region into right and left halves, and it is significant that the ciliated grooves are so arranged as probably to direct a stream of brain-fluid along each side of the septum. It has been already suggested that the choroid plexuses of the vertebrate brain are concerned with the gaseous interchanges which take place in the cavities of the ventricles. In the young Ammocœte the first choroid plexus, which may be supposed to be especially concerned in the respiration of the fore-brain, is not yet developed; the second and third choroid plexuses, belonging respectively to the mid- and hind-brain, are, on the other hand, already extensive. We need not, therefore, be surprised to find that the fore-brain at this stage is dependent to a large extent for its means of respiration, and perhaps also for its nutrition, upon the choroid plexus of the mid-brain, and that a special apparatus in the form of ciliated grooves is developed for securing a forward flow of the necessary fluid in the brain-cavity.

March 20.—"On the Development of the Layers of the Retina in the Chick after the Formation of the Optic Cup." By John Cameron, M.B., Ch.B. (Edin.) Communicated by Prof. Macintosh, F.R.S.

The inner wall of the retinal cup in a fourth-day chick has exactly the same structure as the wall of the embryonic cerebral vesicle or spinal cord at the same date. All the structures which His has described in the wall of the embryonic spinal cord can be also recognised here, and may, therefore, receive similar names—thus, there is a network (the myelospongium) which is formed by spongioblasts, and between the fibres of the myelospongium are found germinal cells which divide to form neuroblasts. From the latter are formed the cells of the outer and inner nuclear layers and the ganglion cells of the retina. On the eighth day the internal molecular layer appears, and on the ninth day the external molecular layer. The first appearance of these layers is due to a rearrangement of the myelospongium, and they map out the three cellular layers. Three kinds of cells are found in the internal nuclear layer at the twelfth day—amacrine, bipolar and basal cells. The cells of the external nuclear layer become rod and cone cells, and from them rods and cones begin to develop on the twelfth day of incubation. The hexagonal pigment cells develop from the outer wall of the retinal cup, and their processes also appear on the twelfth day.

**Linnean Society**, March 6.—Mr. Herbert Druce in the chair, succeeded by Mr. A. D. Michael.—Mr. J. E. Harting exhibited and made remarks upon some unpublished coloured drawings by Messrs. J. G. Millais and A. Thorburn of British freshwater Anatidæ illustrating intermediate phases of plumage, through and irrespective of moulting, not hitherto figured.—A paper by Prof. A. Gruvel, of Bordeaux, was read, dealing with some cirrhipedes preserved in the British Museum of Natural History. The chief feature of the paper was the introduction of several new families into the group Lepadidæ as accepted by Darwin, and modified by Gerstäcker by the separation from it of the Alcippidæ for a single species.—The zoological secretary gave an abstract of a memoir by Prof. Elliott Smith, of Cairo, "On the morphology of the brain in the mammalia, with especial reference to that of the lemurs, recent and extinct." The author has examined either the brain or cast of the brain-cavity of every lemuroid genus living and extinct, and his work is the result of an investigation of the collections of the Royal College of Surgeons Museum, the British Museum, the Zoological Society, aided by gifts of material by Captain Stanley Flower, Mr. Hose, and other persons named. A critical *résumé* of the literature of the subject is followed by a detailed consideration of the sulci, the calcarine and sylvian fissures receiving special attention. The author shows that the simplest lemuroid type of brain is that of the Galaginæ, the most specialised that of the Indrisinæ and Lorisinæ. He shows that in Cheiromys the individual variation of the sulci is so great that the supra-sylvian and lateral fissures alone remain unchanged, and he finds proof in this genus of ontogenetic retrogression, which substantiates the conclusions of Forsyth-Major originally deduced from the study of the living Galaginæ, the Tertiary genus Microchœrus, and more recently from that of the Madagascar genera Globilemur and Megaladapis. For Tarsius he shows, while the brain, in respect to its occipital overlap and the presence of a posterior cornu, as also to the assumption of the microsmatic condition, is the most pithecoid of that of all lemurs; conversely, in the characters of its corpus callosum, hippocampus and cerebellum, it is shown to conform to the lowest Eutherian type. Regarding Tarsius as a lemur, the author concludes that the lemuroid brain is intelligible only on the supposition that it has advanced along the main primate stem and later undergone retrogression. A caudo-occipital curtailment of the hemisphere is regarded as the dominant change which the lemuroid brain has undergone, with accompanying structural simplification; and evidence is adduced to prove that while the lemuroids were ancestrally macrosmatic, the macrosmatic condition at present found to exist in them has been secondarily acquired from a pithecoid microsmatic state, of the order of that retained in the tarsier. Beyond this, the memoir deals exhaustively with the comparative morphology of the pallium of the chief mammalian orders, with especial reference to confusion of ideas concerning fissures to which the term "sylvian" has been applied.

March 20.—Prof. S. H. Vines, F.R.S., president, in the chair.—Prof. J. C. Bose read a paper on electric response in ordinary plants under mechanical stimulus. He first explained his apparatus and methods, and then performed, with the aid of his assistant, a series of experiments showing electric response for certain portions of the plant organism, which proved that as concerning fatigue, behaviour at high and low temperatures, the effects produced by poisons and anæsthetics, the responses are identical with those hitherto held to be characteristic of muscle and nerve and of the sensitive plants. He drew the final conclusion that the underlying phenomena of life are the same in both animals and plants, and that the electrical responses which he had demonstrated are but the common physiological expression of these.—Dr. O. Stapf read a paper on the fruit of *Melocanna bambusoides*, Trin., an endospermless viviparous genus of Gramineæ. Fruits of this very singular grass collected last year were forwarded through Mr. Wild, Conservator of Forests, Bengal. They are of the shape and size of small apples or inverted pears, usually terminating with a short or long beak, the longest measuring as much as 5 inches in length. They consist of a hard, thick, fleshy pericarp, which contains a great deal of starch stored in a parenchymatic tissue, of a testa developed as nutrient layer and present in the mature fruit in an "obliterated" condition, and an embryo possessing an enormous ellipsoid scutellum which fills up the large central cavity of the pericarp, or is partly empty. The epidermis of the scutellum is developed as haustorial epithelium of the kind characteristic of grass-seeds, so far as it is in contact with the pericarp or, rather, the nutrient layer. It is traversed by numerous vascular strands which start from a plate of tangled strands in the axis of the embryo, and send out innumerable branchlets near the surface of the scutellum. The fundamental tissue in which the strands are embedded is delicately walled parenchyma, full of starch. There is no endosperm. Germination starts while the fruits are still on the tree, and the young shoots may attain a length of as much as 6 inches, whilst a bundle of roots is formed simultaneously. During germination, the scutellum acts on the pericarp as it acts in typical grasses on the endosperm, depleting not only the store of starch and other nutrient matter deposited in the cells of the parenchyma, but finally inducing also the partial solution of the cell-walls. This structure of the fruit of Melocanna is almost unique in grasses, and was not known before. It is probably repeated, although with some modifications, in the genera Melocalamus and Ochlandra, which the author intends to make the subject of another paper.—Messrs. A. O. Walker and Andrew Scott read a paper on Crustacea Malacostraca from the island of Abd-el-Kuri, in the Red Sea, collected by Messrs. H. O. Forbes and W. Ogilvie Grant during their expedition to Socotra in 1899. The specimens described were picked out of the residue from a collection of Algæ procured in April of that year, in rock pools

and tidal inlets on the above-named island. Of 13 species thus obtained, seven were described as new to science and three were regarded as belonging probably to new genera. One of these genera (Kuria), it appeared, could not be referred to any of the recognised families of Amphipoda.

**Zoological Society,** March 18.—Dr W. T. Blanford, F.R.S., vice-president, in the chair.—Dr. H. Gadow, F.R.S., read a paper on the evolution of horns and antlers. He stated that three main types could be distinguished in the evolution of the ornamental weapons on the heads of ruminants, and that all these types were referable to an ancient condition in which the beginning weapon, be it one of offence or defence, appeared as a mere exostosis with a thickened skin-pad. This stage resembled that of Dinoceras of the Eocene. Secondly, there was found exostosis of the frontal bone producing a pedicle, surmounted by a cartilaginous mass of apical growth, which by subsequent basal ossification became an antler. Skin originally unaltered and hairy; this, and the chondrostoma or cartilaginous later osseous growth, was shed periodically and constituted the cervine type. A side issue of type ii. was that of pro-giraffe-like animals. Cartilaginous growth preponderant, with multiple and broadened bases. Ossification delayed, but still proceeding from the base, *e.g.* the Samotherium of the topmost Miocene. A further development of this type (ii. *a*) was shown by the giraffe, in which the outgrowth proliferated freely and now formed free growths, ossifying independently, of the cranial bones, but ultimately fusing with them. Type iii. was a continuation of the main line from ii., represented by the prong-buck; predominant epidermal growth produced a horn-shoe, which was periodically shed, but had abolished the shedding of the bony core which represented the antler. Type iv., the highest stage, was represented by the hollow-horned ruminants, in which the horn-shoe was now a permanent feature; but it was important to note that these animals still shed the first, or earliest, generation of the horny sheath. Horns and antlers were developed alike with a cartilaginous matrix, with subsequent ossification. These four types were an illustration of onward phyletic evolution, and these stages were still faithfully repeated in the development of the recent species; this was a clear instance where ontogeny was a shortened recapitulation of phylogeny.—Mr. R. Trimen, F.R.S., communicated a paper by Lieut.-Colonel J. M. Fawcett, entitled "Notes on the Transformations of some South-African Lepidoptera." This memoir was in continuation of one by the same author, already published in the Society's *Transactions*. It illustrated the earlier stages of thirty-two species, of which six belonged to the Rhopalocera and twenty-six to the Heterocera.—Mr. R. I. Pocock gave an account of a new stridulating organ discovered in the scorpions belonging to the African genus Parabuthus. This organ consisted of a granular sharpened or finely ridged area upon the dorsal side of the seventh abdominal somite and of the first and second segments of the tail. The sound was produced by scraping the point of the sting over these granular areas.—A communication from Dr. R. Broom, on the organ of Jacobson in the elephant-shrew, was read, in which the author showed that the organ of Jacobson, which in Erinaceus was of the Eutherian type, was in Macroscelides marsupial in all its details, and was most nearly comparable to that of Perameles. Pointing out that in the allied genera Petrodromus and Rhynchocyon marsupial characters had been discovered by Parker in the skull, the author concluded that Macroscelides was "a very near relation of the marsupials, and had probably little affinity with the more typical insectivores." Dr. Broom noted that Macroscelides had a discoidal deciduous placenta, and that its young were born in a well-developed condition.—A communication from Mr. Frederick Chapman contained an annotated list of the collections of Foraminifera and Ostracoda made by Dr. C. W. Andrews on Cocos Keeling Atoll in 1898.—Mr. G. A. Boulenger, F.R.S., described three new species of fishes from the French Congo under the names *Allabenchelys longicauda* (gen. et sp. nov.), *Labeo lukulae* (sp. nov.) and *Chilochromis duponti* (gen. et sp. nov.).

**Entomological Society,** March 19.—Dr. F. Du Cane Godman, F.R.S., vice-president, in the chair.—Mr. W. J. Kaye exhibited a number of insects from British Guiana, many of them taken by himself, illustrative of Müllerian mimicry. Dr. DuCane Godman remarked that in these regions many different forms of the same butterfly would often occur within a radius of fifty miles, showing a wide range of variation.—Prof. E. B. Poulton, F.R.S., exhibited cocoons of *Malacosoma neustria* collected by Mr. Hamm in 1900, spun upon black-currant and apple-trees in his garden at Oxford. All of them had been attacked by birds through the leaf, this being the thinnest part of the cocoon, and the pupa thus more easily abstracted. With regard to the resting habit of *Hybernia leucophearia*, he said that Mr. Hamm had observed that this moth usually rested in a horizontal position. Dr. Longstaffe said that all the specimens he had observed on green stems affected a similar position, and that he had only found one on a birch-tree. Mr. M. Jacoby said that he never found the species on oak at all, but on palings, also in the same position, which facts Prof. Poulton said tended to show that the protective instinct of the species was retained in such localities.—Mr. G. T. Porritt exhibited two bred black *Larentia multistrigaria* from Huddersfield, and said that the dark form was rapidly increasing in Yorkshire. Of those already emerged and reared from the same brood, three were normal and two dark.—Dr. Frederick A. Dixey read a paper, illustrated by lantern slides, entitled, "Notes on some cases of Seasonal Dimorphism in Butterflies, with an account of Experiments made by Mr. Guy A. K. Marshall." He said that he had long since formed the opinion that *Catopsilia crocale*, Cram., was specifically identical with *C. pomona*, Fabr., and had suspected that the differences between them might prove to be seasonal in character. The belief in their specific identity was held by Piepers and by de Nicéville, neither of whom, however, thought that the dimorphism thus shown had any relation to the seasons. Colonel Yerbury said that a temporary rainfall in a dry season in dry places had a marvellous effect in producing intermediate and wet-season forms. Mr. F. Merrifield pointed out the difference between experiments upon tropical and European species. In the tropics there are not any very great distinctions of seasons and temperature, whereas in temperate climates the seasons are clearly marked off from one another. Prof. E. B. Poulton expressed his opinion that by breeding species through, Mr. Marshall had proved that one form gives rise directly to the other, the pairing of the two forms being a biological test of very considerable value. Colonel Swinhoe, Dr. Jordan and Dr. F. DuCane Godman also joined in the discussion.—Prof. Poulton, F.R.S., read a paper on mimicry illustrated by the Sanger-Shepherd three-colour process, supplementary to his paper read at the meeting of the Society on March 5.

**Mineralogical Society,** March 25.—Dr. Hugo Müller, F.R.S., president, in the chair.—Mr. G. T. Prior contributed a paper on the petrology of British East Africa, the result of examinations of the collection of rock specimens made by Prof. J. W. Gregory during his expedition to Mt. Kenya and Lake Baring in 1892–3, and of collections from the Uganda Protectorate made recently by Sir Harry Johnston. Descriptions were given of the three main groups of rocks, viz., the basement Archæan gneisses and schists, the Palæozoic shales and sandstones and the Tertiary volcanic rocks. The gneisses and schists are associated with dykes both of acid pegmatites and of basic diabasis and epidiorites, and also with granulitic rocks analogous to the Charnockite series of India and Ceylon. Of the Palæozoic Karagwe series a collection of ferruginous shales and siliceous schists from Unyoro was described. These rocks present striking similarities with those of Hatch's Hospital Hill series of the Transvaal and with rocks from the Ingwenyaberg, Swaziland, and a correlation between the Karagwe series and the Cape System of the Transvaal was suggested. The volcanic rocks consist mainly of soda-rich phonolitic rocks which have resulted doubtless from a nepheline-syenite magma. The lavas from the volcanoes of the Great Rift Valley and of Mt. Kenya and the region between are characterised, like those of the Canary Islands and the Azores, by the prevalence of anorthoclase, by the large amount of soda-amphiboles (cossyrite, catophorite, arfvedsonite) as well as of soda-pyroxenes and by the absence of sphene and noseau. They form a remarkable example of a rock-series showing a gradation in composition from basic phonolites, containing nepheline both in large phenocrysts and in the groundmass, through phonolitic trachytes containing no recognisable nepheline, to phonolitic quartz-trachytes, and finally to acid riebeckite-rhyolites containing much quartz. The later eruptive rocks from Mt. Elgon and the western side of the Great Rift Valley present some points of distinction with the earlier erupted rocks. They are generally of a more basic character like those of Kilimanjaro as compared with those of Mt. Kenya. Another point of distinction is the presence in them of titanic acid in large amount, in the form of

perofskite in the more basic nephelinites, and as sphene in the phonolites which are of the more ordinary type without soda-amphiboles. Most of the specimens from Mt. Elgon and the neighbourhood consist of nephelinites, but in some of them the nepheline, both as phenocrysts and in the groundmass, is partially or wholly replaced by melilite. Examples of melanite-nepheline rocks allied to borolanite, and of monchiquite dyke-rocks from Mt. Elgon, were also described. A specimen of nephelinite from the neighbourhood of Ruwenzori containing much perofskite suggested the contemporaneity of the eruptive rocks of Mt. Elgon and of the volcanic region at the foot of Mt. Ruwenzori.

**Royal Meteorological Society**, March 19.—Mr. W. H. Dines, president, in the chair.—Mr. W. N. Shaw, F.R.S., read a paper on la lune mange les nuages, which was really a note on the thermal relations of floating clouds. He also exhibited an arrangement of apparatus whereby the conditions applicable in the case of a floating cloud can be experimentally realised.—Mr. F. J. Brodie read a paper on the prevalence of gales on the coasts of the British Islands during the thirty years 1871–1900. The total number of gales of all kinds dealt with during this period was 1455, the yearly average being 48·5, of which 10·6 were severe. The worst year was 1883, while the quietest was 1889. The stormiest month was January, 1890. At all seasons of the year excepting the summer, the prevalence of gales from south-west is greater than from any other quarter. The minimum of such gales is reached in the spring, when rather less than 20 per cent. are from south-west, more than half the storms being, however, from points between south-west and north-west. The prevalence of gales from polar directions is then at its maximum, more than 21 per cent. blowing from points between north and east. In the spring of 1883, out of a total of eleven gales no fewer than seven were from these quarters, the proportion being about three times the average. The highest velocities recorded were those at Fleetwood during the westerly gales on December 22, 1894, and on January 12, 1899. On the former occasion, for nine hours, from 7 a.m. to 3 p.m., the mean velocity was sixty-four miles per hour, and at 9 a.m. it reached a maximum of seventy-eight miles. It appears that on the average 43 per cent. of the storm systems which visit our coasts advance from some point of the compass lying between south and south-west, and travel towards some point lying between north and north-east. 39 per cent. have an easterly motion, while less than 1 per cent. move westwards. A mean of 264 cases shows that the deep cyclonic systems which visit our islands travel on an average at the rate of 24·1 miles per hour; in some cases, however, the rate was not more than eight or ten miles, while in others it amounted to forty, fifty and even sixty miles per hour. The author concluded his paper by exhibiting a series of weather maps showing the progress of some of the most notable gales during the period covered by the discussion.

## CAMBRIDGE.

**Philosophical Society**, March 3.—Prof. Macalister, president, in the chair.—On a method of increasing the sensitiveness of Michelson's interferometer, by Mr. H. C. Pocklington. It is shown that the sensitiveness of Michelson's interferometer can be greatly increased if we can cause the interfering beams to be circularly polarised in opposite senses. This can be done approximately in the ordinary form of the instrument (with, however, an unsilvered inclined mirror) by placing an eighth-wave plate of mica in front of each of the perpendicular mirrors so that a principal axis of each plate is parallel to the line of intersection of the mirrors, and suitably choosing the plane of polarisation of the incident light. A theoretically better method, in which the inclined mirror and the compensating plate are placed rather less than a quarter-wave apart, is discussed, but it is concluded that only experiment can decide which will be the better method in practice.—The influence of currents in metals on reflected and transmitted light, by Mr. P. V. Bevan.—(*a*) On the conductivity of the vapours of the alkali metals; (*b*) on induced radio-activity, by Prof. J. J. Thomson. The investigation was undertaken with the intention of seeing whether the "induced radio-activity" shown by a metal rod after long-continued negative electrification in the open air would occur if the rod were placed in a closed vessel instead of outside in the open air. The closed vessel was a zinc gasometer 102 cm. high and 75 cm. in diameter; the vessel was insulated and used as one of the electrodes, the other electrode was a metal tube placed at the axis of the cylindrical gasometer. A potential difference of 800 volts between the cylinder and this rod was produced and the current between these electrodes was measured. This current was "saturated" and was therefore a measure of the total ionisation in the gas in the vessel; if the rod became radio-active, the ionisation and therefore the current would increase. The current was measured in the morning, and the rod in the vessel kept connected with the negative terminal of a Wimshurst machine for six or seven hours, when it was disconnected from the machine and the current again measured; if the gas in the vessel were not exposed to Röntgen rays whilst the rod was negatively electrified, the author was not able to detect any increase in the current through the gas as the result of the long negative electrification: if, however, the gas were exposed to Röntgen rays during the negative electrification of the rod, then a well-marked increase in the current took place—the increase being some 16 or 17 per cent.; this increase was due to some alteration in the rod and not to a change in the gas in the vessel, for if a rod similar to the one which had been electrified, but which had not itself been electrified, were substituted, the current sank to its former value. No increase took place in the current if the rod were positively electrified. A number of experiments were made on the currents through the vessel when the vessel was not exposed to rays and when the rod was not electrified. Rods of different sizes and different metals were tried—these all gave approximately the same current; if the rod were carefully wrapped round with dry filter paper, the current showed a decided increase, while if the filter paper were damp, the current was many times its value for the bare rod; the current in this case is greatest when the negative ions move up to the paper-covered rod—a large effect is also produced when the paper is wetted with brine or alcohol, but a solution of $H_2O_2$ produces by far the largest effect yet found.—On the Hall effect in gases at low pressures (second paper), by Mr. H. A. Wilson. The experiments described in this paper are a continuation of those described in the paper entitled "On the Hall Effect in Gases at Low Pressures" (*Proc.* Camb. Phil. Soc., vol. xi. pt. iv.), read to this Society last October. Measurements have been made of the Hall effect and electric intensity in the uniform positive columns in oxygen and hydrogen, and also of the variation of the Hall effect along the discharge in air at various pressures. The Hall effect in hydrogen is found to be capable of being represented by the equation

$$z = 2{\cdot}65 \times 10^{-2}\frac{H}{p},$$

where $z$ is the transverse electric intensity or Hall effect, H the magnetic field and $p$ the pressure in millimetres of mercury. The corresponding equation for oxygen is found to be

$$z = 3{\cdot}8 \times 10^{-3}\frac{H}{p}.$$

The electric intensities in hydrogen and oxygen are found to be given by the equations

$$X = 28\sqrt{p}$$

and

$$X = 26{\cdot}9\sqrt{p}$$ respectively.

The results on the variation of the Hall effect along the discharge are shown by curves which resemble the curves showing the variation of the electric intensity along the discharge. The paper concludes with some theoretical discussion of the results.—On the extraction of the gases from one cubic centimetre of blood, by Mr. J. Barcroft.—On the coefficient of mutual induction between a circle and a circuit with two parallel sides of infinite length, by Mr. G. F. C. Searle.—Notes on Semper's larva, by Mr. K. Ramunni Menon.

## EDINBURGH.

**Royal Society**, February 17.—Prof. Geikie in the chair.—Major W. B. Bannerman, superintendent of the Plague Research Laboratory, Parel, India, gave an account of the work carried on in the laboratory of which Mr. Haffkine is director in chief. A staff of fifty-three, of whom five are European, now occupies a huge building which has been in succession a Roman Catholic seminary, a Governor's residence, and a plague hospital. A detailed account was given of the preparation of Haffkine's prophylactic, which the Indian Government had adopted as a vaccine for the plague. Some interesting statistics were given showing that under precisely similar con-

ditions persons who had been inoculated were distinctly less liable to attack than those who had not been inoculated, that of the inoculated patients who were attacked by the plague a much smaller percentage of cases proved fatal, that the prophylactic was not harmful during the incubation stage of the disease, and that protection began to be effective twenty-four hours after injection, but was not complete until the tenth day. Profs. Fraser, Greenfield and Hunter Stewart took part in the after discussion, Prof. Fraser commenting especially on the fact that the vaccine, valuable though it had been proved to be, had not been shown to be able by itself to control a real epidemic of plague. He believed that more effective control would result from the policy of isolating patients and of enforcing better sanitation. Moreover, Haffkine's vaccine always produced a reaction which, he could not help thinking, might actually convert a case which would otherwise have terminated in recovery into a case which terminated in death. In reply Major Bannerman said he would never decry sanitary measures, but it was at present impossible to get the natives of India to appreciate the blessings of sanitation and the necessity of ventilation. The Government should be induced to introduce the teaching of hygiene into the schools, and it was an extraordinary fact that there was not a medical representative on the Viceroy's Council.—Dr. Hugh Marshall communicated a paper by Mr. J. K. H. Inglis and himself on the action of silver salts on solution of ammonium persulphate. The paper gave the results of measurements of the reaction velocity and of the influence exerted by other salts present in the solution. From these it would appear that the first part of the reaction, giving rise to the formation of peroxide of silver or similar compound, is much slower than the second part, which results in the formation of nitric acid.

March 3.—Sir William Turner in the chair.—Dr. Masterman read a paper on the early development of *Cribrella oculata*, Forbes, of which the leading points may be thus summarised. The segmentation is very variable, but always culminates in a solid morula, which is converted into a blastula by a remarkable process termed multiple egression. A normal gastrula is then produced and the blastopore closes. A process of cell-prolification then causes the formation of mesenchyme and hypenchyme (the latter filling the archenteron). In the bilateral larva the anterior cœlom gives rise to the pre-oral cœlom and to paired lateral cœloms as well as a small central cœlom; the posterior cœlom gives rise to left and right halves which fuse later. The left lateral cœlom becomes the hydrocœle; the right lateral the epigastric cœlom; the central cœlom forms the pericardium or dorsal sac; and the posterior cœlom forms the hypogastric cœlom. The transition from bilateral to radial stages throws light upon the peculiar torsion found in asterids and upon the homology of the mesoderm in echinoderms. A close comparison was drawn between the Cribella larva and Balanoglossus.—Messrs. A. E. Shipley and Edwin Wilson, in a paper on a possible stridulating organ in the mosquito, drew attention to a curious apparatus at the base of the wings of *Anopheles maculipennis*, an apparatus which had escaped the notice of both the systematist and morphologist. The structure is very complex, but consists essentially of a slightly movable bar provided with a series of well-marked teeth which in certain circumstances rasp across a series of ridges. It seems probable that as the wings are raised and depressed the movement of these two surfaces over one another may account for some of the characteristic buzzing of the mosquito.—Dr. Noel Paton gave an account of some observations on the amount of dissolved oxygen in water required by young Salmonidæ.—A paper was also read by Dr. James Scott on the influence of subcutaneous injections of large quantities of dextrose on the metabolism in the dog. It was found that dextrose injected in amounts varying from 5 to 7 grms. per kilo. was as far as possible acted upon by the general tissues of the body and not dealt with by the liver or at once secreted by the kidneys, and the result was a marked increase in proteid metabolism.

DUBLIN.

**Royal Dublin Society**, March 19.—Prof. Grenville A. J. Cole in the chair.—On the progressive dynamo-metamorphism of a porphyritic andesite from co. Wicklow, by Henry J. Seymour. The author described the gradual alteration of a coarsely porphyritic andesite into a finely banded crystalline schist, as the result of earth movements connected with the intrusion of the Leinster granite. The light-coloured bands in the schist consisted of the very much elongated felspar phenocrysts, which are drawn out partly by granulation and partly by recrystallisation into flat lenticles seven or eight times the length of the original crystal from which they were derived. The dark bands are composed of the altered matrix containing abundant secondary biotite.—Prof. E. J. McWeeney, on a method of air-examination by bacteriological procedure. The problem to be solved was whether the air on a certain part of the premises of a Dublin manufacturer was liable to contamination by micro-organisms carried by air currents from a refuse-heap on the premises of a neighbour, the intervening distance being 800 feet. The method consisted in liberating on the refuse-heap a readily recognisable form of micro-organism that does not normally occur in Dublin air, and exposing large Petri dishes (diameter 20 cm.) at various heights at the place where contamination was suspected. The organism used was one that formed red pigment, and was intermediate in character between *B. prodigiosus* and *B. Riliensis*. A thick suspension of this in normal saline was thrown into the air at the refuse-heap by means of a spray apparatus, at the rate of a litre per hour. This was kept up for three hours on a day when the wind was blowing in the required direction. Meanwhile six culture dishes were exposed in the perpendicular position, and at heights varying from about 12 to 60 feet above the ground. Afterwards they were closed and the colonies allowed to develop. On four of the six plates red colonies appeared, viz. on those exposed at the heights of 30, 40, 50 and 60 feet, and subculture showed the organisms composing them to be identical with those that had been sprayed. The success of the experiment was rendered the more remarkable by the fact that rain was falling in torrents throughout the three hours' exposure. The author proposed to develop the method and apply it to other problems of the like kind.

PARIS.

**Academy of Sciences**, April 1.—M. Bouquet de la Grye in the chair.—The new organisation of the study of astronomy and the physics of the globe at the National Observatory of Athens; the presentation of the third volume of the *Annales* of this establishment, by M. Lœwy. The first branch of work developed by M. Eginitis was that of meteorology; at the present time there is one station of the first order at Athens and twenty-one stations of the second order in various parts of Greece. At the same time a systematic study of the geodynamical phenomena of Greece was organised, a network of 550 stations uniformly distributed throughout the whole country dealing with seismic phenomena. The observations from these stations up to the present time have been analysed by M. Eginitis, the results being of great scientific interest. It is clearly shown that there is no connection between the 567 seismic disturbances noted in Greece during the year 1899 and the positions of the moon. Owing to the unavoidable delay in fitting up the astronomical instruments, this branch of work is not so well developed as the others, but aided by the fine climate, valuable observations on meteoric showers have already been recorded.—On the action of human serum on the Trypanosome of the Nagana (*Tr. Brucei*), by M. A. Laveran. It would be supposed that the injection of the serum of an animal naturally immune, such as man, from the attack of the tsetse fly would be without effect in the treatment of animals suffering from the effects of the bites; contrary to expectation, however, human serum has proved to be active. Infected rats and mice, injected with human serum, lost the characteristic organism in from twenty-four to thirty-six hours after the injection. On account of the close analogy between the monkey and man, it appeared to be of interest to compare the action of serum from man and the monkey; the latter serum was found to be quite inactive. The effect of human serum as a preventive against the disease was next tried, but the immunity produced was feeble.—On surfaces of constant negative curvature, by M. Erik Holmgren.—On the heat of solidification of solid ammonia, by MM. de Forcrand and Massol.—A self-recording atmospheric electroscope, by M. G. Le Cadet. An image of the aluminium leaves of the electroscope was projected through a very fine slit on to a revolving sensitised plate. The chief difficulty was due to the extreme fineness of the leaves, this being got over by tilting the box of the electroscope with respect to the optic axis of the apparatus.—On the band spectra

of nitrogen, by M. H. Deslandres. Four distinct groups, characterised by their limits of vibration frequency, have been made out in the spectrum of nitrogen. Cuthbertson has recently shown that the forty bands of the first group can be arranged in thirteen series. Some further regularities in these series are discussed in the present paper.—The cause of the annual period of the aurora borealis, by M. Charles Nordmann. It is known that in mean latitudes the frequency of the aurora possesses a double annual periodicity such that the maxima are at the equinoxes and the minima at the solstices. The author deduces a theoretical explanation of this, which is independent of all hypotheses as to the nature or production of the aurora.—On the composition of the Iodes of Kersanton, by M. Ch. Barrois. The veins of Kersanton are distinguished from ordinary veins by their composite structure; they have been slowly consolidated under the influence of pneumatolithic phenomena for a very long time. The facts observed are in accord with the theory of M. Michel Levy.—An examination of the meteoric iron of Guatemala, by M. Stanislas Meunier. Analysis showed that the Guatemala iron belongs to the Schwetzite type and is similar to the masses of Descubridora (Mexico, 1780), Werchne-Udinsk (Siberia, 1854) and Schwetz (Prussia, 1857).—The best methods of realising stereoscopic radioscopy, by M. Th. Guilloz.

## DIARY OF SOCIETIES.

*THURSDAY*, APRIL 10.

MATHEMATICAL SOCIETY, at 5.30.—A Note on Divergent Series: Dr. Hobson, F.R.S.—Stress and Strain in Two-dimensional Elastic Systems: Prof. Love, F.R.S.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Problems of Electric Railways: J. Swinburne and W. R. Cooper.

ROYAL INSTITUTION, at 3.—The Oxygen Group of Elements: Prof. Dewar, F.R.S.

*FRIDAY*, APRIL 11.

PHYSICAL SOCIETY, at 5.—An Apparatus or Vapour-pressure Measurements: Mr. Grant.—(1) The use of Cathode Rays for Alternating-Current Measurements; (2) An Experiment on the Current Growth in an Inductive Circuit: Mr. Morris.—An Electric Heater: Dr. R. A. Lehfeldt.—Note on the Compound Pendulum: S. A. F. White.

ROYAL ASTRONOMICAL SOCIETY, at 5.—(1) Cape Double Star Results, 1901: (2) Notes on Nebulæ: Royal Observatory, Cape of Good Hope.—Explanation of Use of Tables of $\frac{1}{2}(\theta + \cos\theta)$: W. S. Aldis.—On Stationary Meteor Radiants; Third Paper: H. H. Turner.—Results of Double Star Measures at Windsor, New South Wales, in 1901: J. Tebbutt.—Saturn seen through the Cassini Division: C. T. Whitmell.—On the Probable Motion of some of the Small Stars in the Dumb-bell Nebula: E. E. Barnard.—On the Supposed Variability of $\kappa$ Persei and 36 Persei and a Comparison of the Photographic and Visual Magnitudes of those Stars: W. H. Robinson.—*Probable paper:* On the Relative Number of Star Images photographed in Different Parts of the Plate, and on the Performance of Various Object-Glasses in this respect: H. H. Turner.

MALACOLOGICAL SOCIETY, at 8.

ROYAL INSTITUTION, at 9.—Problems of the Atmosphere: Prof. Dewar, F.R.S.

*MONDAY*, APRIL 14.

SOCIETY OF ARTS, at 8.—Glass for Optical Instruments: Dr. R. T. Glazebrook, F.R.S.

ROYAL GEOGRAPHICAL SOCIETY, at 8.30.—A Journey from Omdurman to Mombasa *viâ* Lake Rudolf: Major H. H. Austin, C.M.G.

*TUESDAY*, APRIL 15.

ZOOLOGICAL SOCIETY, at 8.30.—Contributions to the Osteology of Birds; Part V. Falconiformes: W. P. Pycraft.—On the Windpipe and the Heart of the Condor: F. E. Beddard, F.R.S.—Field-notes upon some of the larger Mammals of Patagonia: Hesketh Pritchard.

ROYAL INSTITUTION, at 3.—Recent Methods and Results in Biological Inquiry: Dr. Allan Macfadyen.

INSTITUTION OF CIVIL ENGINEERS, at 8.—*Discussion:* The Greenwich Footway-Tunnel: W. C. Copperthwaite.—Subaqueous Tunnelling through the Thames Gravel, Baker Street and Waterloo Railway: A. H. Haigh.—*Paper to be read:* On Locomotive Fire-box Stays: F. W. Webb.

ROYAL STATISTICAL SOCIETY, at 5.—Factory Legislation considered with reference to the Wages, &c., of the Operatives protected thereby: Geo. H. Wood.

*WEDNESDAY*, APRIL 16.

SOCIETY OF ARTS, at 8.—Photography as applied to Architectural Measurement and Surveying: J. Bridges Lee.

GEOLOGICAL SOCIETY, at 8.—(1) The Carlisle Earthquakes of July 9 and 11, 1901; (2) The Inverness Earthquake of September 18, 1901, and its Accessory Shocks: Dr. Charles Davison.—The Wood's Point Dyke, Victoria (Australia): F. P. Mennell.

ROYAL MICROSCOPICAL SOCIETY, at 7.30.—Exhibition of Pond Life.

ENTOMOLOGICAL SOCIETY, at 8.—On the Economic Importance of the Parasites of Coccidæ: Alice L. Embleton.—Eastern and Australian Geometridæ in the British Museum Collection: Colonel Charles Swinhoe.

ROYAL METEOROLOGICAL SOCIETY, at 7.30.—Clouds: Capt. D. Wilson-Barker.

*THURSDAY*, APRIL 17.

ROYAL INSTITUTION, at 3.—The Oxygen Group of Elements: Prof. Dewar, F.R.S.

SOCIETY OF ARTS, at 4.30.—Recent Developments in Punjab Irrigation: Sidney Preston.

LINNEAN SOCIETY, at 8.—The Anatomy of Todea with Notes on the Affinity and Geological History of the Osmundaceæ: A. C. Seward, F.R.S., and Miss Sybil O. Ford.—On the New Zealand Phyllobranchiate Crustacea, Macrura: G. M. Thomson.

CHEMICAL SOCIETY, at 8.—Oxonium Salts of Fluoram and its Derivatives: J. T. Hewitt and J. H. Tervet.—The Influence of certain Acidic Oxides on the Specific Rotations of Lactic Acid and Potassium Lactate: G. G. Henderson and D. Prentice.—(1) The Amounts of Nitrogen as Ammonia and as Nitric Acid, and Chlorine in the Rain-water collected at Rothamsted; (2) The Amounts of Nitrogen as Nitrates and Chlorine in the Drainage through uncropped and unmanured land: N. H. J. Miller.

*FRIDAY*, APRIL 18.

ROYAL INSTITUTION, at 9.—The Autocar: Sir J. H. A. Macdonald.

EPIDEMIOLOGICAL SOCIETY, at 8.30.

INSTITUTION OF CIVIL ENGINEERS, at 8.—The Erewash Valley Widening and Toton Sidings: H. C. M. Austen.

INSTITUTION OF MECHANICAL ENGINEERS, at 8.—The Standardization of Pipe Flanges and Flange Fittings: R. E. Atkinson.

## CONTENTS.